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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PHINNEY, JASON R

ART UNIT PAPER NUMBER

2879

DATE MAILED: 06/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/060,842

Applicant(s)

RAINA, KANWAL K.

Examiner

Jason Phinney

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 20-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-12 is/are rejected.
- 7) ☒ Claim(s) 3 and 13-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-19, drawn to a field emission display device, classified in class 313, subclass 496.
 - II. Claims 20-30, drawn to a method of making a field emission display device, classified in class 204, subclass 192.15.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by a materially different process such as CVD.

3. Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Sabin H. Lee on April 1, 2003 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-19.

Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-30 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,137,212 to Liu in view of U.S. Patent No. 4,125,446 to Hartsough.

Regarding Claim 1, Liu discloses a field emission device comprising a faceplate (Figure 8, #50), a baseplate (#20), a luminescent phosphor coating (#58) applied to a lower surface of the faceplate, a cathode member formed on the baseplate; the cathode member comprising a semiconductor layer overlying a substrate and including an emitter tip (#30), an aluminum layer (#22 and Column 3, Lines 62-63) surrounding the tip, an insulating layer (#32a) surrounding the tip and overlying the aluminum layer, and a conductive layer (#34a) surrounding the tip and overlying the insulating layer. Liu fails to exemplify that the aluminum layer should incorporate nitrogen.

Regarding Claim 2, Liu discloses that the conductive layer should comprise a second aluminum layer (Column 4, Lines 20-24). Liu fails to exemplify that the second aluminum layer should incorporate nitrogen.

Regarding Claim 6, Liu fails to exemplify that the aluminum layer including nitrogen should have a resistivity of less than about $10 \mu\Omega$ cm.

Regarding Claim 8, Liu fails to exemplify that the aluminum layer including nitrogen should be substantially hillock free.

Hartsough teaches that nitrogen may be incorporated into an aluminum layer in order to decrease the hillock formation within the layer thereby increasing reflectivity and decreasing the resistivity (Column 4, Table and Column 4, Lines 14-19). The aluminum layer incorporating nitrogen has a resistivity less than about $10 \mu\Omega \text{ cm}$ (see Column 4, Table) and be substantially hillock free (Column 4, Lines 14-19).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate specific amounts of nitrogen into the aluminum layer of Liu as taught by Hartsough in order to decrease the hillock formation within the layer thereby increasing reflectivity and decreasing the resistivity.

7. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,137,212 to Liu in view of U.S. Patent No. 4,125,446 to Hartsough.

Regarding claims 4 and 5, Liu in view of Hartsough teaches the claimed invention except for the limitation of the atomic composition of about 2-10% nitrogen and about 5-8% nitrogen respectively. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the atomic composition claimed, since optimization of workable ranges is considered within the skill of the art.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,137,212 to Liu in view of U.S. Patent No. 4,125,446 to Hartsough.

Regarding claim 7, Liu in view of Hartsough teaches the claimed invention except for the limitation that the aluminum layer including nitrogen should have a surface roughness of about 300 Å to 400 Å. Hartsough teaches that the nitrogen content can be varied to change the surface roughness but fails to exemplify the specific values (Column 4, Table and Column 4, Lines 14-19). It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the atomic composition claimed, since optimization of workable ranges is considered within the skill of the art.

9. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,137,212 to Liu in view of U.S. Patent No. 4,125,446 to Hartsough.

Regarding Claim 9, Liu discloses a field emission cathode comprising a substrate (Figure 8, #20), a luminescent phosphor coating (#58) applied to a lower surface of the faceplate, an emitter tip (#30) formed on the substrate, an aluminum film (#22 and Column 3, Lines 62-63) formed on the substrate and surrounding the tip, and a gate layer (#34a) surrounding the tip and formed above the aluminum layer. Liu fails to exemplify that the aluminum layer should incorporate nitrogen.

Regarding Claim 10, Liu discloses that the gate layer should comprise a second aluminum layer (Column 4, Lines 20-24). Liu fails to exemplify that the second aluminum layer should incorporate nitrogen.

Regarding Claim 11, Liu fails to exemplify that the aluminum film should comprise an aluminum nitride subphase.

Regarding Claim 12, Liu discloses that there should be a dielectric layer (#32a) surrounding the tip and overlying the aluminum layer,

Hartsough teaches that nitrogen may be incorporated into an aluminum layer forming an aluminum nitride subphase in order to decrease the hillock formation within the layer thereby increasing reflectivity and decreasing the resistivity (Column 4, Table and Column 4, Lines 14-19).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate specific amounts of nitrogen into the aluminum layer of Liu as taught by Hartsough in order to decrease the hillock formation within the layer thereby increasing reflectivity and decreasing the resistivity.

Allowable Subject Matter

10. Claims 3 and 13-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 3 and 13, the references of the Prior Art of record fails to show or suggest the combination of the limitations as set forth in claims 3 and 13, and specifically comprising the limitation that there should be a layer of grid silicon located between the dielectric layer and the gate layer.


Regarding claims 14-19, claims 14-19 are allowable for the reasons given in claim 13 because of their dependency status from claim 13.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Phinney whose telephone number is (703) 305-3999. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JP 
May 27, 2003


ASHOK PATEL
PRIMARY EXAMINER